Comments on *Portland Harbor RI/FS Field Sampling Plan: Round 2 Sampling of Benthic Invertebrate Tissue* – 26 September 2005

These comments are submitted on behalf of the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Nez Perce Tribe and the Confederated Tribes and Bands of the Yakama Nation

1. Windward (2005a) stated that Round 2 sampling of *Corbicula* clams using a benthic sledge will focus on stage 3 (mature, longer-lived) communities based on the assumption that these communities will provide the largest mass of invertebrate tissue. The distribution of stage 3 communities in the Initial Study Area (ISA) was mapped using sediment profile imaging, and presented in Sediment Profile Image Survey of the Lower Willamette River (Striplin Environmental Associates 2002: Figures 3-4a-d). Stage 3 communities cover most of the ISA. Of the 22 locations selected for Round 2 sampling in the ISA (Windward and Integral 2005a, Table 2-1, Figure 2-1), "13 are placed along the shoreline of the main lower Willamette channel, 1 is in the Multnomah Channel, and the other 8 are in off-channel slips or embayments. Twenty of the sampling locations are also within sandpiper feeding habitat. All sampling locations are in areas where elevated concentrations of at least one chemical were measured in the Round 2 surface sediment sampling effort (Integral 2005)." Six of the sites were specifically requested by EPA (Windward and Integral 2005a, Table 2-1). However, little additional explanation was presented regarding (1) whether selection of locations was based, at least in part, on the classification of locations as stage 1, 2 or 3 as was done in the previous reconnaissance survey, or (2) other criteria that may have been used for prioritizing and deciding upon specific locations (Windward and Integral 2005a, Table 2-1). Although stage 1, 2 and 3 habitat may correlate well with abundance of benthic infauna such as *Lumbriculus*, it is unlikely to correlate with abundance of clams or mussels. Further, to our knowledge no data have been collected or presented regarding the distribution of clam habitat in the ISA. This seems to be an obvious data gap that should have been addressed long ago, and certainly prior to selection of sites for collecting co-located clam/sediment samples. Thus, the selection of sampling locations should be discussed and agreed upon by the EcoTeam before sampling proceeds. Specific consideration should be given to appropriate stratification of sampling locations with respect to expected contaminant levels in sediment (and clam) samples at these locations based on previous sampling efforts. The reason for this is that preliminary analysis of the relationship between tissue and sediment concentrations (Windward 2005b: Appendix C) indicates that most sediment samples had relatively low levels of most contaminants, and relatively few samples had intermediate to high levels of contaminants. Such unequal stratification of sampling across the range of contaminant concentrations reduces the statistical power of the experimental design. Thus, it is essential that sampling locations be chosen that ensure appropriate stratification of expected contaminant

concentrations among locations within constraints imposed by other sample location selection criteria.

2. The tribes question the logic for and value of collecting co-located clam/sediment samples. Because clams are filter filters, the contaminant levels in their tissues should largely reflect what is in the epibenthic water around them, not what is in the sediment. Thus, clams (and mussels) are not as good a proxy for sediment contaminant levels as benthic infauna such as oligochaete worms (e.g. *Lumbriculus*) would be. Further to this point, in order for contaminant concentrations in sediment to be an adequate proxy for contaminant levels in clams (and by extension other benthic fauna), the strength of the relationship must surpass a threshold value agreed upon by the EcoTeam. That is, variation in contaminant concentration in sediment must explain at least a threshold percentage of the variation in contaminant concentration in clams. From a statistical perspective, this means that the relationship (equation for the best fit model) must equal or exceed a regression coefficient, R^2, of the threshold value, e.g., 70%. To our knowledge, such a threshold value has never been discussed. From various perspectives, including financial ones, it may make more sense to consider a variety of other non-mutually exclusive alternatives including, but not limited to: (1) collecting co-located samples of benthic infauna and sediment, i.e., use benthic infauna instead of clams, and (2) collect clams at more locations, but without co-located sediment.

3. The FSP states that "multiple tows will be performed at each location and the clams will be composited with the previous samples until an estimated weight of 62 g has been achieved." Within an individual location composed of multiple tow sites, how will sediment samples be collected to insure that the mass of sediment collected at each tow site is proportional to the biomass of clams collected at each tow site? Or is it assumed that contamination is uniform within a location so that this level of detail is deemed unnecessary? If so, the geographic scale of variation in contaminant levels based on previous analyses of sediment data does not appear to support this assumption (e.g., PCB data).

4. To assess the potential feasibility of obtaining sufficient biomass of zooplankton for contaminants analyses, Windward and Integral (2005: Table 2-3, Appendix A) (1) conducted 28 plankton tows (3 at each of 8 sites, and1 at each of 4 sites) at a depth of approximately 1 meter for ten minutes each, and (2) deployed a Schindler trap and diaphragm pump at two locations. The plankton tows were dominated by debris and filamentous algae; in addition, "the captured zooplankton were all very small and impossible to sort from the algae and debris in the time allowed." As a result, Windward (2005) concluded that it is not possible to obtain sufficient biomass of zooplankton using bongo nets. Windward did not state a target mass for zooplankton at each site. Regardless, it seems premature to abandon efforts to collect plankton by this method. For example, sampling could be attempted at other locations that differ in ways that might reduce the relative abundance of debris and algae, and increase the relative

abundance of plankton. For example, this might be achieved by sampling at (1) other locations in the river that differ in flow, turbidity, water depth, distance from shore, (2) different times of day (e.g. at night), (3) deeper water depth, and/or (4) different times of year. No mention is made in the Round 2 FSP of any plans to attempt to collect additional plankton samples. If this reflects the intention of LWG to forego any future plankton sampling, we suggest that such potentially successful alternative strategies for collecting plankton be considered, as mentioned above. Collecting plankton samples has been acknowledged to be important to the development of food web models and the tissue residue approach, and should not be abandoned without assessing its feasibility in more detail.

Literature Cited

Integral Consulting, Inc. 2005. Portland Harbor remedial investigation/feasibility study round 2 surface and beach sediment field sampling report. Draft. Prepared for Lower Willamette Group. Integral Consulting, Inc., Mercer Island, WA.

Striplin Environmental Associates, Inc. 2002. Sediment Profile Image Survey of the Lower Willamette River. Striplin Environmental Associates, Inc., Olympia, WA.

Windward LLC. 2005a. Portland Harbor Superfund Site Ecological Risk Assessment: Supplemental Memorandum: Sampling of Invertebrates Using a Benthic Sledge, Bongo Net, and Schindler Trap. Windward Environmental LLC.

Windward LLC. 2005b. Portland Harbor RI/FS: Ecological Preliminary Risk Evaluation. Appendix C: Statistical Analysis of Site-Specific Relationship Between Tissue and Sediment Chemical Concentrations. Windward Environmental LLC.

Windward LLC and Integral, Inc. 2005. Portland Harbor Superfund Site Ecological Risk Assessment Technical Memorandum: Results of Field Sampling Reconnaissance for Invertebrates Using a Benthic Sledge, Bongo Net, Diaphragm Pump, and Schindler Trap. Windward Environmental LLC and Integral Consulting, Inc.